dictions, but as Mr. Chaffee remarks in another column nothing will replace the careful study of the morning weather map whenever that is accessible. Every one should familiarize himself with the typical conditions shown on the maps in order to anticipate severe frosts, floods, gales, and other calamities.

THE DEPTH OF ATMOSPHERIC COLD WAVES.

By means of the kite we shall, undoubtedly, eventually ascertain the depth of the layers of cold air that flow southward over the Mississippi Valley. Meanwhile, we may bear in mind that ever since the establishment of the Weather Bureau stations at Cheyenne and Santa Fe, in 1870 and 1871, it has been well known that most of these cold waves are very shallow. In his February report Mr. F. H. Brandenburg, section director for Colorado, says that the cold waves for this month do not appear to have extended to a great height, since the mean temperature of the plains region was lower than that of the adjacent mountain districts, which are five or six thousand feet higher. The latter regions were usually cloudy with an abnormal and unparalleled amount of snow, while the plains were relatively clear and subject to intense radiation. The average depth of total snowfall for the month is said to be 33 inches in the valleys, 66 inches at timber line, and 76 at higher elevations in the mountain region of Colorado. It is expected that many of the snowdrifts will last all summer, and there will, of course, be an abundance of water for irrigation.

THE BENEFITS OF SEVERE WINTERS.

Mr. J. B. Marbury, section director for Georgia, states that in many respects the severe weather of February was most beneficial to the farmer. The freezing and thawing greatly improved the condition of the soil. The land was softened and pulverized more thoroughly than long-continued plowing could have done; much natural plant food was rendered available for the next growing season; millions of injurious insects were killed. Many are already predicting a splendid crop year.

WEATHER VERSUS CLIMATE.

It is commonly said that the climate is the average weather of a century or some long period of time; that the climate represents normal or average conditions, while the weather is the temporary condition prevailing at any moment. Statistics have been compiled to show some of the relations between the average crops and the average climate. The present Editor has undertaken extensive works in this line, but summed it all up by saying that for crops raised out of doors the relation is too complex to present any results of positive value to either the farmer or the biologist. The fact is that the innumerable combinations between the varying conditions of weather, soil, and plant will, at any stage of growth, affect the plant and crop to an important extent. It is the weather and not the climate that is of importance to the farmer. The weather is everything, the climate is an abstract idea that has very little interest for him. For example, Mr. C. F. R. Wappenhans, Section Director for Indiana, states in his February Report that where the wheat was well protected by snow, the exceedingly cold weather did but very little injury, whereas in the northern portion of the State where but little snow had fallen, many fields appeared to be injured. In some places, although the top of the plant looks brown and dead, yet it is still green lower down near the surface of the ground. Such illustration might be cited for every variety of plant in every variety of location. It is the combination of the weather with peculiarities of the soil and plant that produces favorable or unfavorable conditions. Plants are sometimes injured in the Southern States by a cold wave because the preceding warm weather had developed them rapidly, while on the same date those in northern regions escaped uninjured because the steady cold weather had retarded their development.

Most of our fruits and grains are being cultivated in regions that are far removed from their native habitats. We have spread all over the United States the peaches that came from Persia, the corn from central Mexico, the wheat from Egypt and India, and so on indefinitely. The success in raising profitable crops in any part of the country must depend upon the frequency with which injurious weather conditions recur. A favorable locality is not one whose average climate is favorable, but one in which the extreme severities of the weather do not recur too often. The cultivation of peaches, oranges, grapes, and other fruits whose plants require five or ten years to mature, may be profitable if killing weather does not recur oftener than once in ten or twenty years. Tobacco and cotton and the grains that must be started annually, may be cultivated profitably if bad seasons do not recur oftener than once in five years.

We would invite our readers to review carefully their own personal knowledge of local crops in their respective districts and communicate to us a statement as to the dates and manner in which any given plant or crop was injured by the weather at any time during the past ten years. When a cold spell occurs it is commonly stated that this has destroyed the peaches or the corn, or has injured the tobacco, etc., but these statements are often mere guess work. We believe them implicitly at the time, and yet the resulting crop turns out about as usual, showing that our judgment was quite erroneous. As a rule, during the months succeeding a disastrous freeze, Nature does her best to repair the damage, and often succeeds to a surprising extent. The plant has within it what may be called a power to struggle against adversity and to accomplish a crop if this be not entirely impossible.

We commend to all the careful study of the true relation between the weather and any given crop, and a determination of the relative frequency of good, average, and poor years.

EXPERIMENTS IN PROTECTION FROM FROST.

In the February report of the Louisiana section Mr. Alexander G. McAdie, who is about to return to San Francisco, Cal., gives some account of the extensive system of experiments undertaken at Woodland, near Diamond, La., as a study of methods of protection against frost. It seems that the orange grower in Louisiana is concerned only with the protection of the tree during the months of January and February, for the fruit itself has never yet been injured by frost. The cold weather of February, 1895, destroyed nearly all the orange trees except in the extreme southern portion of the State, not more than 60 miles from the mouth of the Mississippi. On the other hand, the experiments at Woodland, which is about 43 miles south of New Orleans and about 20 miles north of the limit just given, have shown that by flooding the whole orchard at any time the injuries produced by ordinary freezes may be averted. Possibly the freeze of February, 1895, could have been thus nullified, but the still more severe freeze of February, 1899, demanded extra precautions. In addition to the flooding there were tried smudges and matting and hilling up the earth around the trees. The injury done by the freeze of this current month was aggravated by the fact that the extremely warm weather of the 3d, 4th, and 5th of February had started the sap and forced the growth so that the trees were killed or badly injured by the freeze of February 12–13, except in the section where the

earth was hilled up around the trees. There is reason to believe that the latter method of protection saved that portion of the orchard, although the temperature must have been about 10° Fahrenheit on the 13th.

THE DUST IN THE ATMOSPHERE.

An excellent article on dust contributed by A. H. Thiessen, observer, to the February number of the Report of the Montana section, leads us to suggest that those interested in adding to our knowledge of this subject, should make use of the dust counter devised by Mr. John Aitken and then described by him on pages 734–754 of his article in Weather Bureau Bulletin No. 11, part 3. The original dust counter has received several successive modifications and in its present form has become a portable or pocket instrument which packs into a case about the size of a well filled cigar case; it can, we believe, be obtained at a comparatively slight cost by addressing Mr. Aitken, directly, at Darroch, Falkirk, Scotland.

THE UTILITY OF THE WEATHER BUREAU LIBRARY.

For several years past the Chief of the Weather Bureau has endeavored to eke out the limited facilities for study and scientific reading available at our regular Weather Bureau stations by circulating copies of certain journals devoted to the progress of science in general. In addition to this the attention of the observers at our regular stations should be called to the fact that if there is any book in the library of the Weather Bureau that they desire to consult, it can easily be sent to them for that purpose. It is desirable to make the library as useful as possible to the service.

Of course, books should not be kept out very long owing to the probability that others will also wish to see them, but it is a great deal better to have the use of the original memoir of an author, if only for two weeks, than to rely upon abstracts and reviews by others. The Weather Bureau observers are invited to make full use of the library in order to familiarize themselves with recent advances in meteorology and its applications to the needs of the community.

THE BLESSING OF COLD WEATHER.

The great cold wave of February gives occasion for some remarks under the above heading in the News and Courier, Charleston, S. C., February 26:

It is something to be proud of that we have seen zero and still live. * * * Mississippi and Louisiana may at least be reasonably certain that the yellow fever, which for the past two years has lingered in concealment, has been effectually slain by the cold. * * * Charleston will be all the better for the freezing process and the loss she has sustained in early vegetables and fruit will be more than compensated in other ways. * * * The loss falls on special individuals but the whole community is benefited.

It is fortunate that physicians have at least discovered that the old idea that warmth is essential to the cure of all kinds of lung diseases is a mistake and that they now recognize that cold, dry air will do more for the sufferers than the tropic climates of the south.

RECENT EARTHQUAKES.

Through the kindness of Commander N. Sebree, U. S. N., lighthouse inspector, Mr. John F. Ingersoll, keeper of the Point Sur Light station, 36° 25′ N., 121° 55′ W., on the coast of California, reports on the earthquake of February 7 as follows:

The tower is built on solid rock; the second assistant keeper was on watch in the tower, sitting down reading. There has been no earthquake here recently. The time when the shock was felt was 8:55 p. m., standard railway time, viz, one hundred and twentieth meridian time. The clock was compared with the Western Union clock in Monterey on the 9th. The shock only lasted one or two seconds. There was only one shock felt; it was very light and not noticed generally. There was no other cause than earthquake for the jar felt here. The jar came horizontally from the east; the clock in the tower faces the east and the jar caused the pendulum to strike the front and sides of the clock, but the clock did not stop.

February 8–9, several reports published in the Chicago papers state that earthquake shocks were felt about 11 p. m., February 8, and at 12:30 a. m., 1 a. m., 3 a. m., and between 3 a. m. and 4 a. m., also some time after 6 a. m. of the 9th.

Mr. J. J. Cox, forecast official, Weather Bureau, reports that several shocks, felt yesterday and this morning, may have been an earthquake, but are quite as likely to have been due to the freezing and cracking of huge icefields in the Lake.

February 9, several shocks are reported from Belen, N. Mex.

February 13, light shocks at Napa and Sonoma, Cal.

February 13, an earthquake was felt distinctly at Lynchburg, Va., during the great blizzard of that morning; many persons were awakened, buildings shaken, and furniture moved; it was considered more violent than any that has been felt there in recent years.

February 13, at Mount Airy, N. C., at 4 a. m., lasting ten seconds; at Charlotte, N. C., at 4:30 a. m., oscillations from southeast to northwest.

On February 13, 4:30 a. m., the citizens of Winston, N. C., were awakened by four severe earthquake shocks.

February 13, an earthquake shock with grinding noise was felt at 4:35 a. m., (evidently eastern standard time) at Radford, in southwestern Virginia. A distinct shock was also felt at Martinsville, Henry County, Va., and the shock was felt throughout that part of the State. An earthquake of from 5 to 10 seconds duration was felt in eastern Tennessee at 3:30 a. m., of the same date (evidently central standard time).

Professor Marvin states that no earthquake was recorded on the Washington seismograph on this date.

February 24, light shock at San Bernardino.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

Prof. Charles E. Thorne, on behalf of the library of the Ohio Agricultural Experiment Station, at Worcester, Wayne County, Ohio, states that he has a number of odd numbers of the MONTHLY WEATHER REVIEW for the years 1876–93, and desires, by exchange or otherwise, to complete the files of the library of that station by obtaining the complete volumes for the years previous to 1881, and individual numbers for subsequent years, as follows:

1881. February, March, May, December, Summary.
1882. All after July.
1883. Summary.
1884. February, August, December, Summary.
1885. All after June.
1886. The entire volume.
1887. January, February, May, Summary.
1888. Summary.
1890. January.
1894. June.

THE WEATHER BUREAU AND THE ICE BUSINESS.

We take pleasure in noting that, according to The Ice World, a journal published at Albany in the interest of the